Extron® Electronics

INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

TPS150

Twisted Pair A/V Switching and Transmission System

68-958-01 **Rev. B**
Printed in USA
10 04

Precautions

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

Alimentations• Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

Quick Start — TPS150 Switching and Transmission System

Installation

Step 1

Turn off power to the input and output devices, and remove the power cords from them.

Step 2

If desired, mount the TPT150 transmitter in a rack.

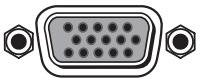
Step 3

If desired, mount the TPR150 receiver using the included projector bracket.

Step 4

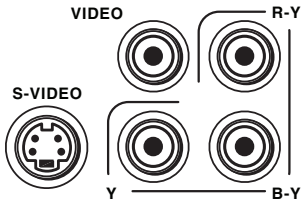
Connect source video devices to the transmitter's inputs.

Inputs 1 and 2 — Connect two RGB video sources.



If desired, connect a monitor to the Input 1 Local Monitor connector.

Inputs 3 and 4 — Connect **either** component video, S-video, **or** composite video sources.



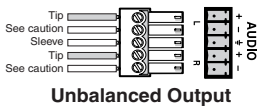
NOTE *For proper system operation, connect **only one** video format to input 3 and input 4.*

Step 5

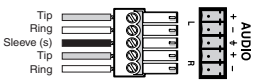
Connect audio devices to the input 1 through input 4 left and right RCA connectors.

Step 6

Connect an audio device, such as powered speakers, to this 3.8 mm, 5-pole captive screw connector for balanced or unbalanced audio output.



Unbalanced Output

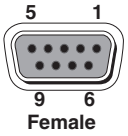


Balanced Output

CAUTION *Connect the sleeve to ground. Connecting the sleeve to a negative (-) terminal will damage the audio output circuits.*

Step 7

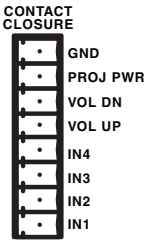
Connect a host device, such as a computer or touch panel control, to the transmitter via this 9-pin D connector and a null modem serial port cable for serial RS-232 control.



TPS150 pin	Connected RS-232 device pin	Function
1	—	Not used
2	RX	Receive data
3	TX	Transmit data
4	—	Not used
5	Gnd	Signal ground
6	—	Not used
7	—	Not used
8	—	Not used
9	—	Not used

Step 8

Connect an optional CTP150CM control panel module or other contact closure device to this 8-pin 3.5 mm captive screw connector. See chapter 2, *Installation*.

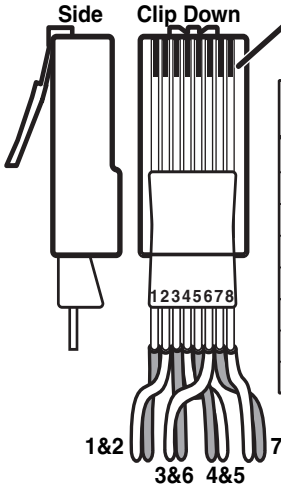


To make your own contact closure device, wire the connector as shown at right. To issue a command, momentarily short the appropriate pin to ground.

Step 9

Connect a shielded twisted pair (**STP**) cable or foil shielded pair (**FTP**) with RJ-45 connectors between the transmitter and receiver. Ensure that both ends of the cable are terminated using the same protocol, **either** TIA/EIA 568 A **or** 568 B.

NOTE *Extron recommends **STP** or **FTP** cable **only**.*

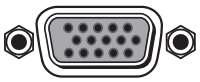


Pin	568 A Wire color	568 B Wire color
1	White-green	White-orange
2	Green	Orange
3	White-orange	White-green
4	Blue	Blue
5	White-blue	White-blue
6	Orange	Green
7	White-brown	White-brown
8	Brown	Brown

Step 10

Connect a projector or plasma display to the receiver's video outputs.

Output 1 — Connect a VGA cable between the 15-pin HD female connector and the VGA or RGB input on the display.



Output 2 — Connect a composite video cable between this BNC female connector and the composite video input on the display.

Output 3 — Connect an S-video cable between this 4-pin mini DIN female connector and the S-video input on the display.

Output 4 — Connect a cable between these BNC female connectors and the component video input on the display.

Step 11

Connect a serial cable between the receiver's RS-232 Port connector and the serial control connector on the display for control of the display. See the drawing on page QS-1 to wire the connector for RS-232. See chapter 2, *Installation*, for RS-422 and RS-485 control.

Step 12

Plug the transmitter, receiver, and input and output devices into a grounded AC source, and turn on the transmitter and input and output devices.

Setup and Operation

Input and projector codes

When user-specified serial commands are programmed for the Input Select buttons and the Projector Power button, the transmitter sends that serial command to the receiver when the button is pressed. The receiver, in turn, issues the command to the projector.

When a user-specified power on (warm up) or power off (cool down) delay is programmed into the transmitter, the transmitter disables all front panel controls for the duration of the delay.

The projector power timeout function (if enabled) automatically powers off the projector after a user-defined interval.

See chapter 4, *Serial Communications*, to:

- Program a serial command to each of the transmitter's Input Select buttons.
- Program projector power on and power off commands to the Projector Power button.
- Set the projector power timeout function.
- Program the projector power delays.

Transmitter Operation

Input Select buttons and LEDs select and identify inputs.

Blank button and LED toggle the video mute function on and off and identify the mute on or off status.

Projector Power button, when programmed, commands the projector to power itself on and off.

Projector Power LED, when lit, indicates that the projector power is on. The LED blinks during the power on and off delay (if programmed).

NOTE *Some projectors use the same command for power on and off. If the same code is specified for on and off, the Projector Power LED blinks for each button push.*

Volume △ and ▽ buttons

- Increase and decrease the output volume.
- Increase and decrease the selected input's audio level.

NOTE *Press and **hold** the appropriate Input Select button while you use the Volume buttons to adjust that input's level.*

Mute button and LED toggle the audio mute function on and off and identify the mute on or off status.

Receiver Operation

Cable Equalization Select button and LEDs toggle between high frequency and low frequency to equalize using the Cable Equalization button and indicate the selection.

NOTE *Low frequency affects the visible image smear. High frequency affects the detail and sharpness.*

Cable Equalization Adjust button increase (+) and decrease (–) the amount of equalization applied to the selected frequency range (high or low) of the output signal.

Skew Adjustment controls (rear panel) correct for the delay inherent in network (CAT 5) cable.

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Chapter 1 One

Introduction

About this Manual

About the Transmission System

TP Cable Advantages

Features

Introduction

About this Manual

This manual contains installation, configuration, and operating information for the Extron TPS150 audio/video Twisted Pair (TP) switching and transmission system.

- Chapter 1 identifies the transmitter's and receiver's features.
- Chapter 2 details how to install the transmitter and receiver.
- Chapter 3 describes how to operate the transmitter and receiver from their front panels and use all of their features.
- Chapter 4 provides information about programming and operating the switcher under RS-232 control, such as from a PC or host controller. You can control the switcher using Extron's TPS150 serial command set or the ICS100 control program.
- Appendix A lists the transmitter's and receiver's specifications and pertinent part numbers.

About the Transmission System

The TPS150 consists of two components: the TPT150 AV switcher/TP transmitter (referred to in this manual as the "switching transmitter" or the "transmitter") and the TPR150 TP video receiver (referred to in this manual as the "receiver") (figure 1-1). The transmitter and receiver form a switching and long distance transmission system. The TPS150 system sends high resolution RGB video (such as VGA video), low resolution video, and RS-232 control signals to a projector, plasma display, or other display over a single Category (CAT) 5 shielded twisted pair (STP) or foil shielded twisted pair (FTP) cable. The system includes cable compensation and skew control technology that allow you to use these standard network cables.

NOTE *Extron recommends the use of **STP** or **FTP** cable **only**.*

About the TPT150 switching transmitter

The TPT150 transmitter accepts and switches between the following four video inputs:

- **Input 1 and input 2 —** High resolution video (such as VGA) on 15-pin HD connectors. Input 1 includes a buffered local monitor loop-through connector.
- **Input 3 and input 4 —** For each input, one only of the following three video formats:
  - **Component video (Y, R-Y, B-Y)** on three female RCA connectors
  - **S-video** on one 4-pin mini DIN connector
  - **Composite video** on female RCA connector

Each input also accepts an unbalanced line level stereo audio signal on left and right RCA connectors. The level of each audio input is individually adjustable to ensure that there is no noticeable volume difference when switching among sources.

The switching transmitter outputs the selected input audio as balanced or unbalanced line level audio on a 5-pin 3.5 mm captive screw connector. The output can also be muted.

NOTE *The audio for the selected input is output locally. It is **not** sent to the receiver.*

The TPT150 has an RS-232 port that accepts ICS100 program control from a connected computer or serial command control from a computer or control system. The transmitter can also store serial commands that are entered by the operator. The transmitter sends the appropriate serial commands on the TP link to the receiver whenever an input button or the projector power button is pressed.

An optional CTP150CM control panel can be connected to a contact closure port on the TPT150. Using the CTP150CM, a remote operator can select inputs, power up and down a projector connected to the receiver, and increase and decrease the output volume.

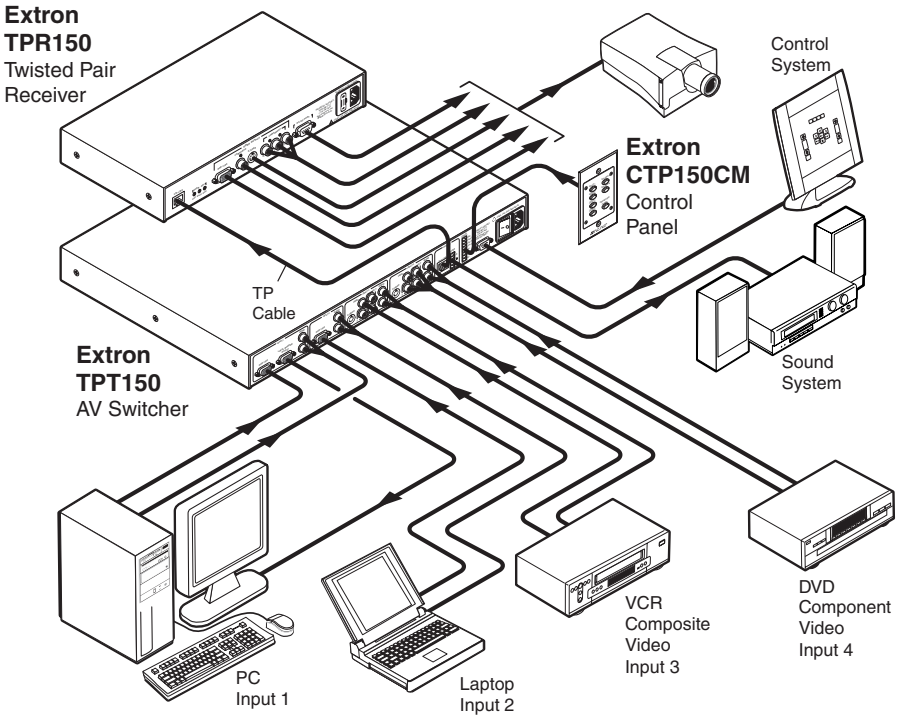


Figure 1-1 — Typical TPS150 Switching and Transmission System application

About the TPR150 receiver

The TPR150 receiver accepts the TP link from the transmitter and outputs the received video and RS-232 commands. The receiver outputs the following signals on the following connectors:

- **High-resolution RGB video** on one female 15-pin HD connector
- **Component video (Y, R-Y, B-Y)** on three female RCA connectors
- **S-video** on one female 4-pin mini DIN connector
- **Composite video** on one female RCA connector
- **Serial (RS-232) commands** on one male DB9 connector

TP Cable Advantages

Twisted pair cable is much smaller, lighter, more flexible, and less expensive than coaxial cable. The TPT150 makes cable runs simpler and less cumbersome. Termination of the cable with RJ-45 connectors is simple, quick, and economical.

Transmission distance

The maximum distance is determined by the output frequency and resolution. The following table specifies the recommended maximum transmission distances using STP or FTP CAT 5 cable, terminated with CAT 5 rated connectors.

NOTE *It is possible to exceed the recommended distance; however, image quality may be reduced.*

NOTE *We recommend the use of pre-terminated and tested cables. Cables terminated on site should be tested before use.*

Recommended transmission ranges at 60 Hz

Video format	Maximum range
640 x 480	500 feet
800 x 600	500 feet
1024 x 768	500 feet
1280 x 1024	300 feet
1600 x 1200	250 feet

Features

Four input A/V switcher — Accepts, switches, and transmits RGBHV, component video (Y, R-Y, B-Y), S-video, composite video, and RS-232 serial content. Accepts and switches unbalanced line level stereo audio.

Buffered monitor output on input 1 — Provides for local monitor output on a 15-pin HD female VGA connector, enabling a signal to be easily monitored locally without the need for a separate distribution amplifier.

Universal projector control — The TPS150 provides universal projector control via serial commands entered by the installing technician. Commands are automatically sent when the input selection or Projector Power buttons are pressed. The included ICS100 control software makes storing projector or display control codes easy

Skew compensation control — Individual red, green, and blue skew controls adjust for the timing delays commonly encountered when CAT 5, CAT 5e, or CAT 6 cable is used.

Sharpness control — Provides video equalization with individual low frequency and high frequency adjustments. The low frequency control helps remove image smearing. The high frequency control restores image sharpness and detail.

Audio input level adjustment — Each individual input has a level adjustment via the front panel and RS-232 control. Audio levels are saved for each input and are automatically recalled when that input is selected.

Audio output volume adjustment and muting — The output has volume control adjustment via the front panel, RS-232 control, or optional contact closure panel control.

Control — Switcher control is available through the front panel, an RS-232 port serial link, and an optional contact closure control panel. Serial control is provided with the Extron ICS 100 control software and/or a control system issuing serial commands.

Custom engraved front panels — The front panel controllers include attachment posts to hold an optional custom-engraved name plate. Extron can create a custom front plate to neatly and professionally label each input button. Contact the Extron S³ Sales & Technical Support Hotline to order the custom plate.

Optional CTP150CM control panel — Seven soft-touch buttons control the input selection, volume up and down, and display power on and off. The CTP150CM is available in a black or white finish and installs in CPM Series modular connector panels that accept a quad-size Mini Architectural Adapter Plate (MAAP).

Chapter Two

Installation

Mounting the Transmitter and Receiver

Cabling and Rear Panel Views

TP Cable Termination

Installation

Mounting the Transmitter and Receiver

The TPS150 comes with rubber feet for the transmitter and receiver, a set of MTR102 rack ears for the transmitter, and a set mounting brackets for the receiver.

Rack mounting the transmitter

If desired, rack mount the transmitter as follows:

1. Remove the rubber feet from the bottom of the transmitter.
2. Attach the 992546-2 rack mounting ears to the transmitter with the six provided #8 machine screws (figure 2-1).
3. Insert the transmitter into the rack, aligning the holes in the mounting bracket with those of the rack.

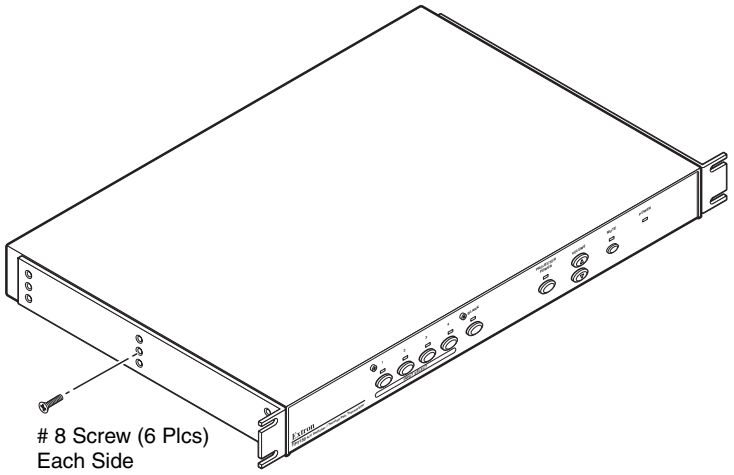


Figure 2-1 — Mounting the transmitter

4. Secure the transmitter to the rack using the supplied machine screws.

Projector mounting the receiver

If desired, projector mount the receiver as follows:

1. Remove the rubber feet from the bottom of the receiver.
2. Attach the supplied 992547-2 projector pole mounting brackets to the receiver with the four provided #8 machine screws (figure 2-2).

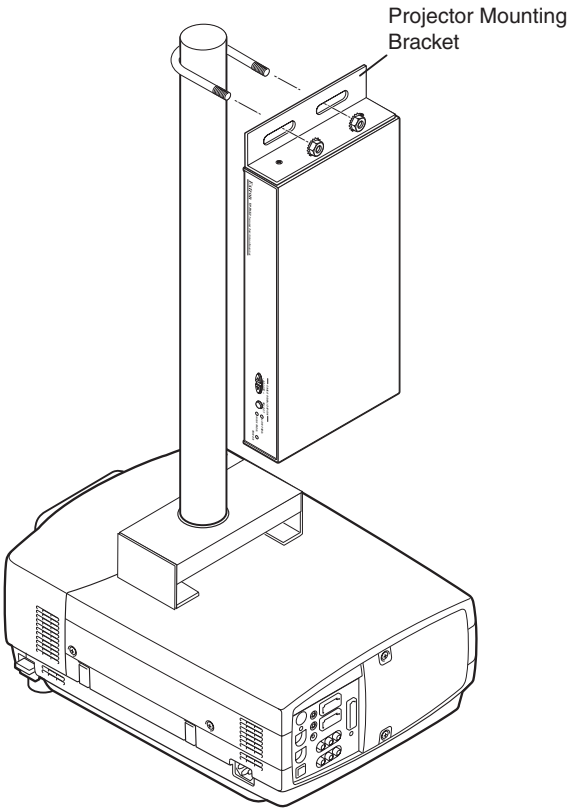


Figure 2-2 — Projector mounting the receiver

Cabling and Rear Panel Views

Transmitter connections

All connectors are on the rear panel (figure 2-3).

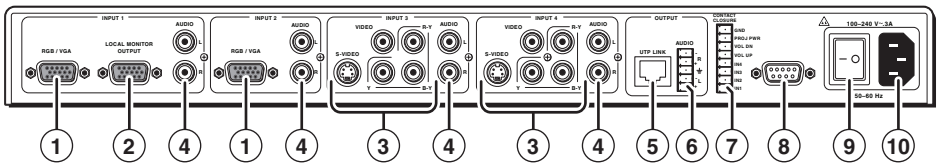


Figure 2-3 — TPT150 transmitter rear panel connectors

Video and audio input connections

1. **Input 1 and Input 2 RGB/VGA video connectors —** Connect RGBHV or RGBS sources to these 15-pin HD female connectors.

2. **Input 1 local monitor output connector —** If desired, connect a local monitor or other device to this 15-pin HD female connector.

3. **Input 3 and Input 4 video connectors —** Connect **either** component video, S-video, **or** composite video sources to these BNC and 4-pin mini DIN connectors.

NOTE *For proper system operation, connect **only one** video format to input 3 and input 4.*

Connect the various video formats as shown in figure 2-4.

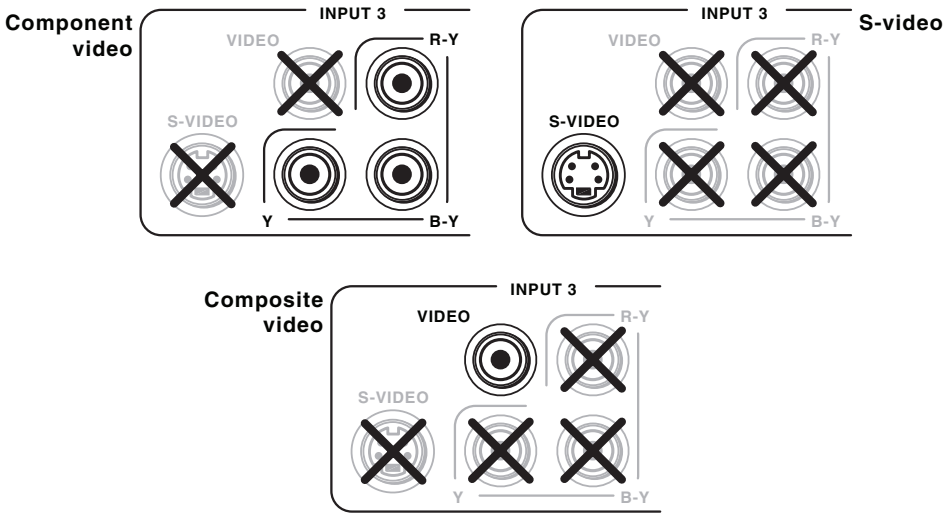


Figure 2-4 — Input 3 and input 4 video format connections

④ **Input audio connectors —** Connect unbalanced stereo or mono audio sources to these pairs (left and right) of RCA connectors for audio input.

TP and audio output connections

⑤ **TP connector —** Connect one end of an STP or FTP cable to this RJ-45 female connector on the transmitter.

Connect the free end of the same TP cable from the transmitter to the RJ-45 female connector on the receiver.

See *TP cable termination*, on page 2-6, to properly wire the RJ-45 connector.

NOTE *Extron recommends the use of **STP** or **FTP** cable **only**.*

⑥ **Audio connector —** Connect an audio device, such as powered speakers, to this 3.8 mm, 5-pole captive screw connector for balanced or unbalanced audio output.

Figure 2-5 shows how to wire the captive screw audio connector. The connector is included with the transmitter, but you must obtain the cable. Insert the wires into the appropriate openings in the captive screw connector. Tighten the screws on top to fasten the wires.

CAUTION *Wiring the audio incorrectly can damage the audio output circuits.*

Connect the sleeve(s) to ground (GND). Connecting the sleeve(s) to a negative (-) terminal will damage audio output circuits.

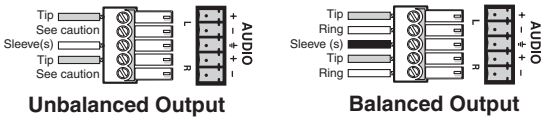
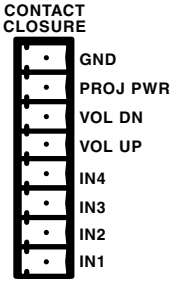


Figure 2-5 — Wiring the audio output connector

NOTE *The audio output always follows the video switch.*

Remote control connections

⑦ **Contact Closure —** If desired, connect an optional CTP150CM control panel module or other contact closure device to this 8-pin 3.5 mm captive screw connector. Refer to the *CTP150CM* manual.



To make your own contact closure device, wire the connector as shown at right. To issue a switching, volume, or projector power command, momentarily short the appropriate pin to ground.

⑧ **RS-232 port —** Connect a host device, such as a computer or touch panel control, to the TPT150 transmitter via this 9-pin D connector and a null modem serial port cable for serial RS-232 control (figure 2-6).

TPS150 pin	Connected RS-232 device pin	Function
1	—	Not used
2	RX	Receive data
3	TX	Transmit data
4	—	Not used
5	Gnd	Signal ground
6	—	Not used
7	—	Not used
8	—	Not used
9	—	Not used

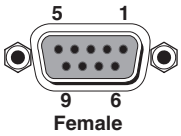


Figure 2-6 — Remote port pin assignments for the TPT150 and TPR150

See chapter 4, *Serial Communications*, for definitions of the ASCII commands and instructions to install and use the control software.

Power connection

⑨ **AC power switch —** Toggle the AC power switch to the on (|) position to turn on the transmitter.

⑩ **AC power connector —** Plug a standard IEC power cord into this connector to connect the transmitter to a 100 to 240VAC, 50 Hz to 60 Hz power source.

Receiver connections

All receiver connectors are on the rear panel (figure 2-7).

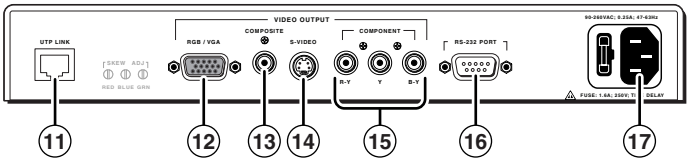


Figure 2-7 — TPR150 receiver rear panel connectors

TP input connection

⑪ **TP connector —** Connect the free end of the STP or FTP cable from the transmitter to this RJ-45 female connector on the receiver.

See *TP cable termination*, on page 2-6, to properly wire the RJ-45 connector.

Video output connections

⑫ **RGB/VGA video connector —** Connect a VGA cable between this 15-pin HD female connector and the VGA or RGB input on the display.

⑬ **Composite video connector —** Connect a video cable between this BNC female connector and the composite video input on the display.

⑭ **S-video connector —** Connect an S-video cable between this 4-pin mini DIN female connector and the S-video input on the display.

⑮ **Component video connector —** Connect a cable between these BNC female connectors and the component video input on the display.

Serial connection

⑯ **RS-232 connector —** Connect a serial cable (figure 2-6) between this 9-pin D connector and the RS-232 connector on the display for control of the display.

Power connection

⑰ **AC power connector —** Plug a standard IEC power cord into this connector to connect the receiver to a 100 to 240VAC, 50 Hz to 60 Hz power source.

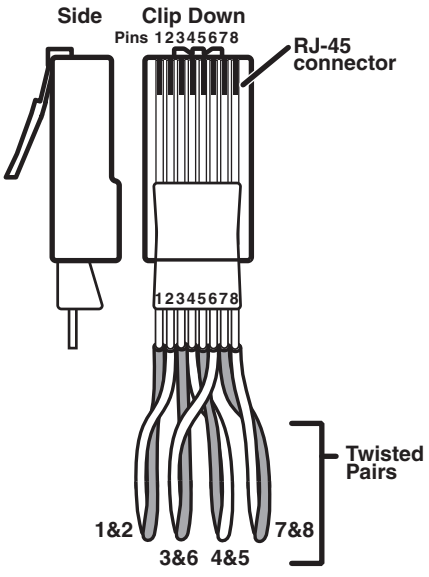
NOTE *The receiver is protected by a 1.6 A, 250 V, time delay fuse. If necessary, replace with a time delay fuse with the same amperage and voltage rating.*

TP Cable Termination

NOTE *RJ-45 termination must comply with the TIA/EIA T 568A or TIA/EIA T 568B wiring standards for all connections.*

NOTE *Extron recommends the use of **STP** or **FTP** cable **only**.*

Figure 2-8 details the recommended termination of CAT 5 TP cable with RJ-45 connectors in accordance with the TIA/EIA T 568A or TIA/EIA T 568B wiring standards. You can use either standard, but ensure that you use the same standard on both ends of the cable.



Pin	568 A Wire color	568 B Wire color	RGB video signals	Component video signals
1	White-green	White-orange	Blue +/V. sync +	B-Y +
2	Green	Orange	Blue –/V. sync –	B-Y –
3	White-orange	White-green	RS-232 +	RS-232 +
4	Blue	Blue	Green +/H. sync +	Y +
5	White-blue	White-blue	Green –/H. sync –	Y –
6	Orange	Green	RS-232 –	RS-232 –
7	White-brown	White-brown	Red –	R-Y –
8	Brown	Brown	Red +	R-Y +

Pin	568 A Wire color	568 B Wire color	S-video signals	Composite video signals
1	White-green	White-orange		
2	Green	Orange		
3	White-orange	White-green	RS-232 +	RS-232 +
4	Blue	Blue	Y +	Video +
5	White-blue	White-blue	Y –	Video –
6	Orange	Green	RS-232 –	RS-232 –
7	White-brown	White-brown	C –	
8	Brown	Brown	C +	

Figure 2-8 — TP cable termination

3

Chapter Three

Operation

Controls and Indicators

Operations

Optimizing the Video

Troubleshooting

Operation

Controls and Indicators

Transmitter controls and indicators

NOTE *The TPT150 transmitter will not operate properly unless it is connected to a powered TPR150 receiver.*

All of the transmitter's controls are on the front panel (figure 3-1).

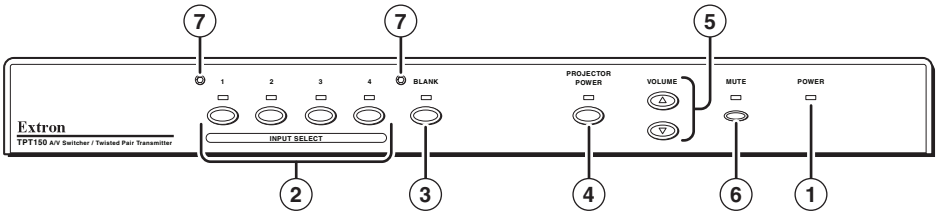


Figure 3-1 — TPT150 transmitter front panel

(1) **Power LED —** When lit, the Power LED indicates that power is applied to the transmitter.

(2) **Input Select buttons —** The Input 1 Select through Input 4 Select buttons select the associated video and audio input. The selected video input is transmitted to the receiver. The selected audio input is output locally.

If a user-specified serial command is set for an Input Select button, the transmitter also sends that serial command to the receiver when the button is pressed. The receiver, in turn, issues the command to the projector. See chapter 4, *Serial Communications*, to specify the command to be sent.

The Input Select buttons are also used in conjunction with the Volume buttons ((5)) to adjust each input's audio level. See *Volume adjustment* on page 3-5 for more details.

(3) **Blank button and LED —** Press the Blank button to toggle video mute on and off. When the output is blanked, no video is transmitted to the receiver, which, in turn, outputs a blank image. The video mute function mutes the video signals only; the sync signal(s) are still active. The Blank LED lights to indicate that the video is blanked.

(4) **Projector Power button and LED —** Press the Projector Power button to transmit one of two user-specified serial commands to the receiver, which then issues the command to a device such as a projector. See chapter 4, *Serial Communications*, to specify the command(s) to be sent.

The Projector Power LED lights green when the power on command is the most recent command transmission and is unlit when the power off command is the most recent transmission.

NOTE *If a projector power on (warm-up) delay or projector power off (cool-down) is programmed (see chapter 4,* Serial Communications*), the Projector Power LED blinks while that delay times out. All front panel operations are disabled during the delay.*

NOTE *Some projectors use the same command for power on and power off. If the same code is specified for on and off, the Projector Power LED blinks for each button push.*

⑤ **Volume up and down buttons —** The Volume up (△) and Volume down (▽) buttons are used to increase and decrease the output volume and the selected input's audio level. See *Volume adjustment* on page 3-5 for more details.

The Volume buttons are also used to reset the transmitter. See *Full system reset* on page 3-5.

⑥ **Mute button and LED —** Press the Mute button to toggle audio mute on and off. When the output is muted, the transmitter outputs no audio on its local Audio connector. The Mute LED lights to indicate that the audio is muted.

⑦ **Faceplate posts —** These posts can hold an optional custom-engraved name plate. Extron can create a custom front plate to neatly and professionally label each input button. Contact the Extron S³ Sales & Technical Support Hotline to order the custom plate.

Receiver controls and indicators

The receiver has controls on the front panel and the rear panel (figure 3-2).

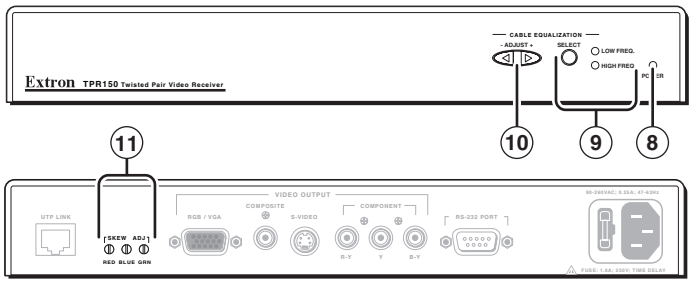


Figure 3-2 — TPR150 receiver front panel

⑧ **Power LED —** When lit, the Power LED indicates that power is applied to the receiver.

⑨ **Cable Equalization Select button and LEDs —** Press the Select button to toggle between high frequency and low frequency to equalize. The High Frequency LED and Low Frequency LED indicate the frequency range that is selected for equalization. Equalize the cable with the Adjust button (⑩). See *Optimizing the Video* on page 3-6 for more details.

⑩ **Cable Equalization Adjust button —** Press the + side of the button to increase the amount of equalization applied to the selected frequency range (high or low) of the output signal. Press the – side of the button to decrease the amount of equalization. Select the frequency range with the Select button (⑨). See *Optimizing the Video* on page 3-6 for more details.

⑪ **Skew Adjustment controls —** Use an Extron Tweeker or other small screwdriver to correct for the delay inherent in network (CAT 5) cable. See *Optimizing the Video* on page 3-6 for more details.

Operations

The following paragraphs detail the power-up process and then describe selecting an input, issuing the projector power up and down commands, and adjusting the input level and output volume.

Power

Apply power to the transmitter by connecting the power cord to an AC source and toggling the AC power switch to the on (|) position. Apply power to the receiver by connecting the power cord to an AC source.

When AC power is applied, the transmitter and receiver perform a self-test that flashes all of the transmitter's front panel LEDs on and off once. An error-free power up self-test sequence leaves the transmitter's selected input LED, the Power LEDs, and the receiver's High Frequency LED on.

The selected input, the audio input level and output volume, and the blank and mute on/off status are saved in non-volatile memory. When power is applied, the latest configuration is retrieved.

Input selection

Press the Input Select button on the transmitter for the desired input. When you select an input, the following occurs:

- The transmitter sends the video portion of the selected input to the receiver on the TP link. The receiver outputs the video on its appropriate Video Output connectors.
- If the operator has pre-programmed a serial command or data string for the selected input (such as a projector's own input selection or video format command), the transmitter sends that serial string to the receiver on the TP link. The receiver then outputs the serial string on its RS-232 port. See chapter 4, *Serial Communications*, to specify the command to be sent.
- The transmitter outputs the audio portion of the selected input locally, on its own rear panel Audio Output port.

Projector power

NOTE *The receiver does not receive a confirmation from the projector that it is on or off. Rather, after the TPT150's power is applied, the first serial string the transmitter sends to the receiver (which passes it to the projector) is the string that was programmed as the projector power on command. From that point, every time you push the button, the transmitter alternates between sending the power off command and the power on command. If the projector is powered on or off locally, the transmitter sends the wrong command the next time the Projector Power button is pressed.*

The Projector Power control is typically used to remotely command the connected projector to power itself up or down. Command strings to be transmitted must be programmed in advance. The projector power timeout function (if enabled) automatically powers off the projector after a user-defined interval. See chapter 4, *Serial Communications*, to specify the commands to be sent and to set the timout function.

Press the Projector Power button on the transmitter to issue the projector on or off command. When you push the button, the following occurs:

- If **no command** has been transmitted since transmitter power was applied, or if the **power off command** was the last command transmitted:
  - The transmitter sends the power on string to the receiver on the TP link.
  - The transmitter lights its Projector Power LED.
  - The transmitter starts its power off timout function (if enabled).
  - The receiver outputs the received serial string on its RS-232 port.

NOTE *Some projectors use the same command for power on and power off. If the same code is specified for on and off, the Projector Power LED blinks for each button push.*

- If the **power on** command was the last command transmitted:
  - The transmitter sends the power off string to the receiver on the TP link.
  - The transmitter turns off its Projector Power LED.
  - The receiver outputs the received serial string on its RS-232 port.

NOTE *The same sequence of events occurs when the projector power timeout function (if enabled) expires.*

Volume adjustment

Output volume —

Press and release the Volume up (△) or Volume down (▽) button to increase or decrease the output volume by 1dB per button push or press and **hold** the button to ramp the output volume up or down.

Input audio level —

1. Press and hold the desired Input Select button.
2. While you continue to **hold** the Input Select button, press and release the Volume up (△) or Volume down (▽) button to increase or decrease the selected input's volume or press and **hold** the button to ramp the selected input's volume up or down.
3. Release the Input Select button.

Full system reset

To restore the I/O configurations, projector codes, volume levels, and serial setup to the default setting, press and **hold** the transmitter's Volume up (△) and Volume down (▽) buttons while you apply power to the transmitter. Continue to hold the Volume buttons until the transmitter LEDs stop changing and then release the Volume buttons.

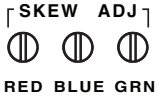
Receiver reset

To reset a TPR150 receiver to its default settings, disconnect TPT150 transmitter power for 10 seconds or more.

Optimizing the Video

The TPR150 receiver features cable equalization controls for high and low frequency adjustments and RGB skew control to compensate for misconvergence of colors that can result from long CAT 5 cable runs. The following steps detail how to use these features to optimize the output image.

NOTE *These adjustments should be made with the highest resolution input selected on the TPT150 transmitter.*



1. Carefully set the rear panel RGB skew controls to minimum (fully counterclockwise).
2. Power up the transmitter, receiver, and display.
3. Select the highest resolution.
4. As needed, use the front panel low frequency control to eliminate any visible image smear.

   a. If necessary, press and release the Cable Equalization Select button to light the Low Frequency LED.
   b. Press the + side of the button to increase the amount of equalization applied to the output signal's low frequency range. Press the – side of the button to decrease the amount of equalization.
5. As needed, use the front panel high frequency control to maximize the detail and sharpness.
   a. If necessary, press and release the Cable Equalization Select button to light the High Frequency LED.
   b. Press the + side of the button to increase the amount of equalization applied to the output signal's high frequency range. Press the – side of the button to decrease the amount of equalization.
6. If the red, green, and blue video are not properly aligned, use a Tweeker or small screwdriver to gently adjust the red, green, and/or blue Skew Adjustment controls to correct for the delay inherent in network (CAT 5) cable.

NOTE *The Skew Adjustment controls are sensitive. Make each adjustment carefully.*

7. Repeat steps **4** through **6** to fine tune the adjustments.

Troubleshooting

This section gives recommendations on what to do if you have problems operating the transmitter/receiver system, and it provides examples and descriptions for some image problems you may encounter.

The following tips may help you in troubleshooting.

- Some symptoms may resemble others, so you may want to look through all of the examples before attempting to solve the problem.
- Be prepared to backtrack in case the action taken does not solve the problem.
- It may help to keep notes and sketches in case the troubleshooting process gets lengthy. This will also give you something to discuss if you call for technical support.
- Try simplifying the system by eliminating components outside the system that may have introduced the problem or made it more complicated.
- For sync-related problems: Portable digital projectors are designed to operate close to the immediate video source (the receiver). Sync problems may result from using long cables or from improper termination. A sync adapter, such as Extron's ASTA (active sync termination adapter), may help solve these problems.
- For LCD and DLP projectors and plasma displays: In addition to the sync-related information above, check the user's manual that came with the projector for troubleshooting tips, as well as for settings and adjustments. Each manufacturer may have its own terms, so look for terms like "auto setup," "auto sync," "pixel phase," and "tracking."

General checks

1. Ensure that all devices are plugged in and powered on. The transmitter and receiver both have Power LEDs to indicate that power is applied.
2. Ensure that the input selected is active.
3. Ensure that the proper signal format is supplied.
4. Check the cabling and make corrections as necessary.
5. Reset the switcher. See *Full system reset* on page 3-5.
6. Call the Extron S³ Sales & Technical Support Hotline if necessary.

Specific problems

The table below shows some common operating problems and their solutions.

Problem	Possible cause	Solution
No image appears.	System not receiving power	Ensure that the video source, the transmitter and receiver, and the display are plugged into a live AC power source and the transmitter is turned on.
	No video input	Check that the input device is sending a video signal to the transmitter.
	No video output	Select a different input. If a screen display does not appear, check the output connection.
	The projector has the wrong input/signal format selected.	On the projector, manually check that the input and format are correct. If not, check that the proper signal string for the input selection is programmed into the transmitter.
	Video may be muted.	Press the transmitter's Blank button to disable video mute.
Distorted image appears.	Improperly adjusted receiver	Follow the steps in *Optimizing the Video* on page 3-6.

Chapter Four

Serial Communications

ICS100 Windows Control Program

Serial Commands

The transmitter must be programmed with commands to be sent upon input selection and with projector power on/off commands before those commands will be sent.

The transmitter can also be configured with several serial port variables to match the controlling device and the device to be controlled.

You can program and operate the transmitter either by using the ICS100 Windows-based control program or by sending individual ASCII commands. Both programming methods require that a null modem serial port cable be connected between a computer and the transmitter's RS-232 port.

ICS100 Windows-Based Control Program

The ICS100 Control Program, a graphical control software for Windows, provides a way to program the transmitter.

System requirements

- **Operating system** —
  Windows 95 / 98 / ME / NT / 2000 / XP / XP Pro

NOTE *If you are using Windows NT, Service Pack 6 must be installed.*

- **Hardware** — Pentium 150 or faster CPU
- **Memory** — Minimum: 128 MB
  Recommended: 256 MB
- **Screen resolution** — Minimum: 800 x 600
  Recommended: 1024 x 768
- **Disk space** — 5 MB

Installing the software

The control program is contained on a CD-ROM, and must be installed on the hard drive.

1. Click *Start > Run*.
2. Click the *Browse* button. An open file window appears.
3. Navigate to the drive or folder that contains the software.
4. Double-click the setup icon.
5. Click *OK* in the Run window.
6. Click *OK* in the InlineControl Setup window.
7. Follow the instructions in the setup program to complete the installation.

Establishing communications with the program

NOTE *The TPT150 transmitter will not operate properly unless it is connected to a powered TPR150 receiver.*

Start the control program and establish communications with the TPT150 as follows:

1. Click *Start* > *Programs* > *Extron* > *ICS100*. The control program window appears.

   The TPS150 does **not** respond until it has been contacted with the valid address.

   If you have previously connected to the transmitter and you have not addressed any other device since then, after a moment, the program reports that it has connected to a TPT150 (figure 4-1). Proceed to step **10**.

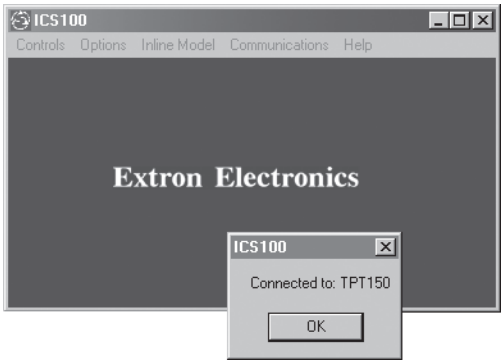


Figure 4-1 — ICS100 program window and connected message

   If you have not connected to the transmitter before or if you have connected to a different device since then, after a moment, the program reports a failure to connect (figure 4-2). Continue to step **2**.

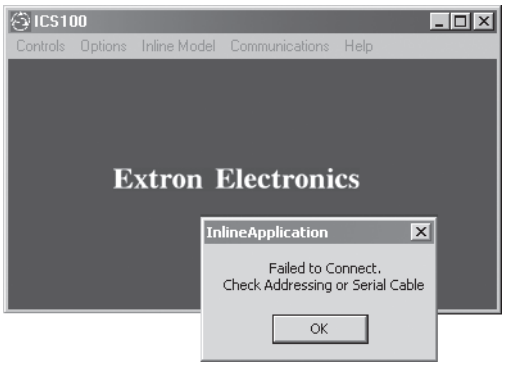


Figure 4-2 — ICS100 program window and warning

NOTE *The transmitter's serial port is factory-configured to 9600 baud, no parity, no flow control, half-duplex mode. If desired, the computer's serial port settings can be changed from within the ICS100 program.*

2. Click *Communications > Comm Port > Comm 1 (or the correct Comm port)*. The serial port setup window appears (figure 4-3).

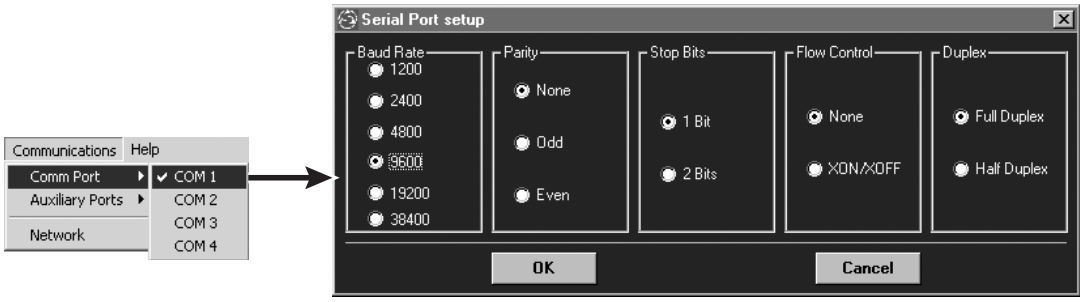


Figure 4-3 — Serial port setup window

3. Click in the appropriate radio buttons to select the desired settings for the computer connected to the transmitter.
4. Click *OK*.
5. Click *Inline Model > Select Address*. The addresses window (figure 4-4) appears.

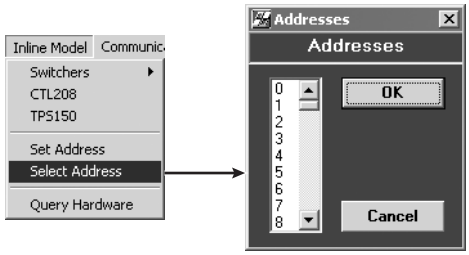


Figure 4-4 — Addresses window

NOTE *The transmitter must be addressed before it will accept and respond to commands. The addressing operation routes setup information to a particular unit on a network and enables command responses. Once the transmitter is addressed, it can accept an unlimited number of commands. If a different unit is addressed, the TPS150 ignores subsequent commands until it is addressed again.*

The factory-installed default address is 97, but this number can be changed. The transmitter can also take commands after receiving a broadcast address of 00, but it does not send responses. Broadcast addressing is for multiple units on a network serial line in half-duplex mode.

6. Click and drag on the slider or click the scroll up (▲) or scroll down (▼) button until the desired address is visible.
7. Click on the desired address. The default address is 97.
8. Click *OK*.

9. Click *Inline Model* > *Query Hardware* to configure the ICS100 program to communicate with the TPT150 and to confirm that communications have been established with the transmitter. The connected window appears (figure 4-5).

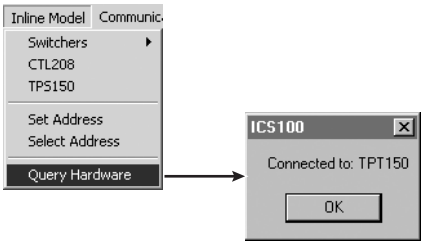


Figure 4-5 — Connected window

10. Click *OK*.

11. Use the software to configure serial port settings, program the input and projector codes, and/or operate the transmission system. See the procedures on the following pages.

NOTE *After you are finished sending commands to the transmitter, always end the session by selecting a different address from the one assigned to the TPT150. This prevents the transmitter from responding to commands meant for another unit.*

12. Click *Inline Model* > *Select Address*. The Addresses window (figure 4-4) appears.

13. Click and drag on the slider or click the scroll up (▲) or scroll down (▼) button until an address other than the transmitter's address is visible.

14. Click on the desired address.

15. Click *OK*.

Using the software to configure the serial port settings

If necessary, use the ICS 100 software to change the serial port settings of either the transmitter or receiver.

NOTE *The transmitter's serial port is factory-configured to 9600 baud, no parity, no flow control, half-duplex mode. If desired, serial port settings can be changed from within the ICS100 program.*

1. Click *Communications > Comm Port > Comm 1 (or the correct Comm port)*. The serial port setup window appears (figure 4-6).

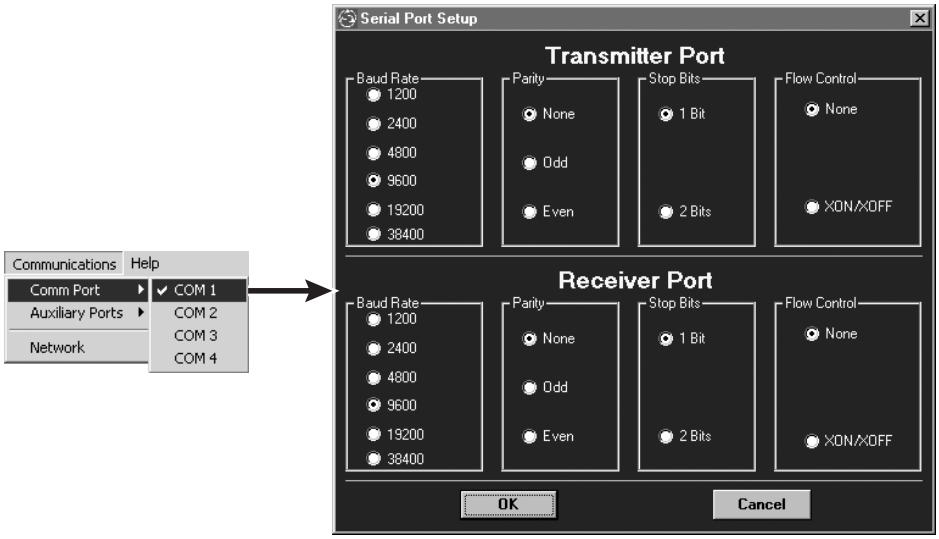


Figure 4-6 — Serial port setup window

2. Click in the appropriate radio buttons to select the desired settings for the transmitter and the receiver.

NOTE *The receiver's RS-232 port should be connected to the display device's communications port. Refer to the display device's user manual for the appropriate serial port protocol and settings.*

The transmitter and receiver are buffered and can operate with different serial port protocols.

3. Click *OK*.

NOTE *If you change the serial protocols, communications between the computer and the transmitter are lost until the computer is updated to match the new transmitter settings).*

4. If no further operations are to be performed, halt communication with the switcher by selecting a different address. See *Establishing communications with the program*, step **12**.

Using the software to program the input and projector codes

Use the control program to program the transmitter's input selection and projector power on/off buttons as follows:

1. Click *Controls* > *Projector Codes* > *Input Codes*. The Program Projector Codes window appears (figure 4-7).

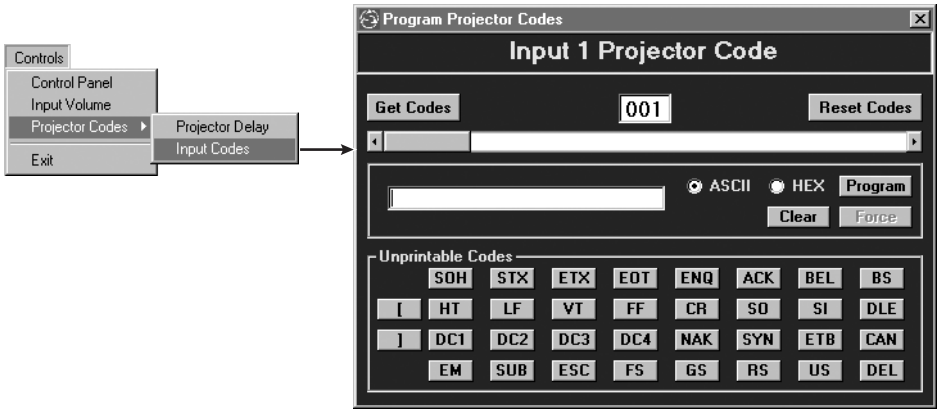


Figure 4-7 — Program Projector Codes window

2. **For each input or projector code to be programmed**:

   a. Click and drag the slider to select the desired input or projector code or enter one of the following into the field above the slider (figure 4-8):

   - **1 through 4 —** Input 1 through 4 code
   - **5 —** Power off code
   - **6 —** Projector on code

Figure 4-8 — Input or projector code selection

   b. Click in the ASCII or Hex radio button to select the appropriate format.

NOTE *Selecting the Hex radio button causes the transmitter to convert the primary code that you will enter in step* ***2c*** *to a hex value before saving it. Then, when you press the button, the transmitter sends the hex value.*

c. Enter the desired code in the code window (figure 4-9).

Figure 4-9 — Code entry (ASCII code)

NOTE *Codes that are intended to be hex codes must be in pairs (such as 03 or DE). Use a leading 0 if necessary. Letters must be uppercase. Spaces between bytes are acceptable in ASCII codes (figure 4-9), but are not allowed in hex codes (figure 4-10).*

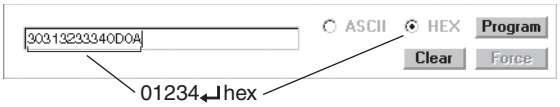


Figure 4-10 — Code entry (hex code)

NOTE *Clicking one of the* Unprintable Codes *(figure 4-11) buttons inserts that function into the line feed or carriage return string of data characters. Unprintable codes are displayed in the code window as* | *(figure 4-12).*

Code	Definition	Code	Definition	Code	Definition
[	Left bracket	VT	Vertical tab	ETB	End of transmission block
]	Right bracket	FF	Form feed	CAN	Cancel
SOH	Start of heading	CR	Carriage return	EM	End of medium
STX	Start of text	SO	Shift out	SUB	Substitute
ETX	End of text	SI	Shift in	ESC	Escape
EOT	End of transmission	DLE	Data link escape	FS	File separator
ENQ	Enquiry	DC1	Device control 1	GS	Group separator
ACK	Acknowledge	DC2	Device control 2	RS	Record separator
BEL	Bell	DC3	Device control 3	US	Unit separator
BS	Backspace	DC4	Device control 4	DEL	Delete
HT	Horizontal tab	NAK	Negative acknowledge		
LF	Line feed	SYN	Synchronous idle		

Figure 4-11 — Unprintable codes

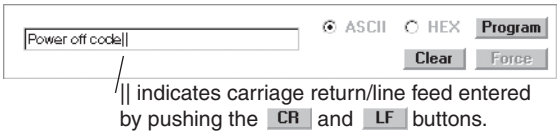


Figure 4-12 — Code entry with unprintable codes

d. Click *Program* to save the command.

3. Repeat step **2** for each button or code to be programmed.
4. Click ☒ in the upper right corner of the window to close the window.
5. Click *Controls* > *Projector Codes* > *Projector Delay*. The program projector delay window appears (figure 4-13).

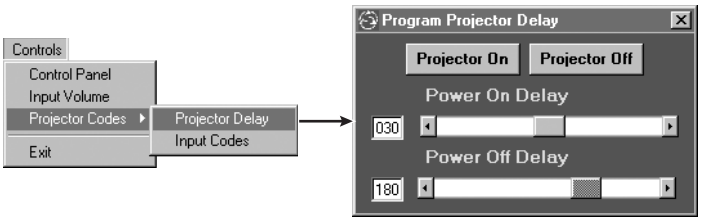


Figure 4-13 — Program projector delay window

NOTE *When you open the window, the ICS 100 automatically resets the projector delay in the transmitter to 0 seconds and displays 000 in the variable window.*

6. For the power on (warm-up) delay (0 to 60 seconds) and power off (cool-down) delay (0 to 256 seconds), click and drag the slider or click the scroll left (◀) or scroll right (▶) button until the desired interval (in seconds) appears in the variable window.

NOTE *The ICS100 program automatically sends the revised projector delay to the transmitter as soon as you move the slider.*

NOTE *If you click the* Projector On *or* Projector Off *button, the Projector Power LED on the transmitter's front panel blinks while the delay times out. All front panel operations are disabled during the delay.*

7. Click ☒ in the upper right corner of the window to close the window.
8. If no further operations are to be performed, halt communication with the switcher by selecting a different address. See *Establishing communications with the program*, step **12**.

Using the software to operate the transmission system

Use the control program to operate the transmitter as follows:

1. Click *Controls* > *Control Panel*. The transmitter control panel window appears (figure 4-14).

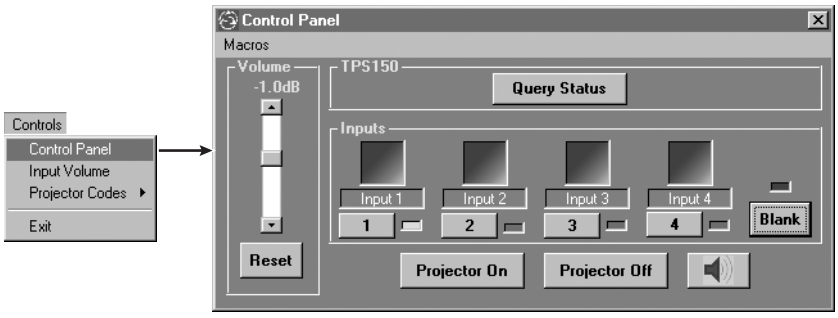


Figure 4-14 — Transmitter control panel window

2. With the exception of input audio level, the controls on the control panel window operate the same as the physical front panel of the transmitter. See chapter 3, *Operation*.

NOTE *If you click the* Projector On *or* Projector Off *button, the Projector Power LED on the transmitter's front panel blinks while the delay times out. All front panel operations are disabled during the delay.*

NOTE *The* *button mutes and unmutes the audio output.*

3. For input volume control, click *Controls* > *Input Volume*. The Set Input Volume window appears (figure 4-15).

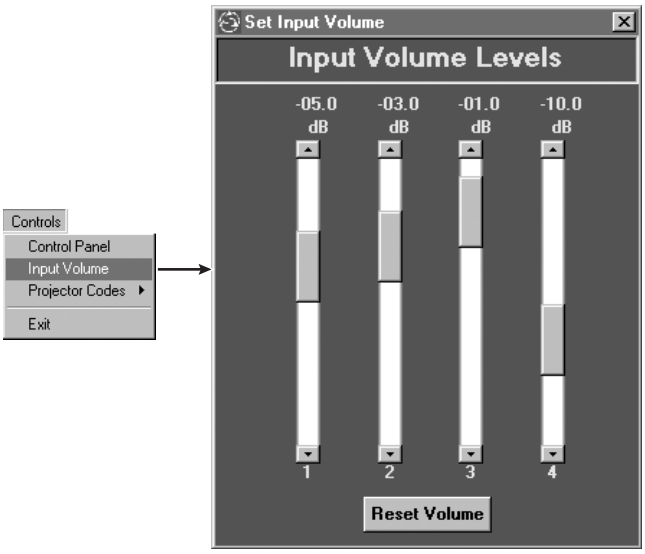


Figure 4-15 — Transmitter input volume window

   a. For each input, select that input on the front panel.

   b. Click and drag on the slider or click the scroll up (▲) or scroll down (▼) button to adjust the input level from 0dB (unity) through –15dB as required for best performance.

NOTE *Clicking the* Reset Volume *button resets each input's audio level to 0db (unity).*

4. Click ✕ in the upper right corner of the window to close the window.

5. If no further operations are to be performed, halt communication with the switcher by selecting a different address. See *Establishing communications with the program*, step **12**.

Using the help system

For information about program features, you can access the help program in the following ways:

- From the ICS100 startup window, select Help from the Help menu.
- From the Button Codes window, press the F1 key.

Serial Commands

Communication protocols

The transmitter's and receiver's serial ports (figure 4-16) are factory-configured to 9600 baud, no parity, no flow control, half-duplex mode. If you change the transmitter's serial protocols, communications between the computer and the transmitter are lost until the computer is updated to match the new transmitter settings.

TPS150 pin	Connected RS-232 device pin	Function
1	—	Not used
2	RX	Receive data
3	TX	Transmit data
4	—	Not used
5	Gnd	Signal ground
6	—	Not used
7	—	Not used
8	—	Not used
9	—	Not used

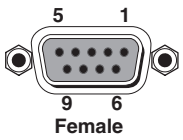


Figure 4-16 — Remote port pin assignments for the TPT150 and TPR150

NOTE *The communications protocols of the receiver should match the protocols of the device to be controlled.*

Command and response structure

Valid commands consist of a leading delimiter, one or more characters in a command code, and an ending delimiter. The transmitter's response to an RS-232 command also consists of a leading delimiter, a command code, and an ending delimiter.

The transmitter's leading delimiter code is always a left bracket ([ ). The ending delimiter code is always a right bracket ( ]).

Example: [CPp@] — where "[" is the leading delimiter, "CPp@" is the command (reset the transmitter's serial port to default values), and "]" is the ending delimiter.

Addressing the transmitter

The transmitter must be addressed **before** it will accept and respond to commands. The address packet ([CC##], where ## is the 2-digit address) routes setup information to a particular unit on a network and enables command responses. Once the transmitter is addressed, it can accept an unlimited number of commands. If a different unit is addressed, the TPT150 ignores subsequent commands until it is addressed again.

The factory-installed default address is 97, but this number can be changed. The transmitter can also take commands after receiving a broadcast address of 00, but it does not send responses. Broadcast is for multiple units in a network configuration in half duplex mode.

By definition, the display device connected to the receiver's RS-232 port is assigned an address that is one larger than the transmitter's (for example, 98 to the transmitter's default 97). If you address the display, the transmitter passes the commands received directly through to the receiver's RS-232 port, allowing you to control the display. The transmitter also passes responses on the receiver's RS-232 port back to its own serial port.

When the system is in *Pass-Through* mode [CC98], commands and responses are sent between the transmitter and receiver. If the system is not in *Pass-Through* mode, all of the receiver responses to the transmitter's button commands are buffered until you return the system to pass-through mode, at which time the buffered responses are sent back to the controlling device. In this way, the controller can track the activity that has occurred.

After you are finished programming the transmitter, always terminate the session by sending an address packet to another unit with a different address. This prevents the transmitter from responding to commands meant for another unit.

Transmitter responses

When a command is valid, the transmitter performs the command and sends the following response:

[R0•{address}•{echo of the command sent}•]

When a command is invalid, either because the command is not recognized or it contains invalid parameters, the transmitter sends the following response:

[R1•{address}•{echo of the command sent}•]

Using the command/response table

The command/response table begins on page 4-14. The command set is case sensitive and commands must be entered as shown. The table below shows the hexadecimal equivalent of each ASCII command.

ASCII to HEX Conversion Table																Esc	1B	CR	ØD	LF	ØA
Space	2Ø	!	21	"	22	#	23	$	24	%	25	&	26	'	27						
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F						
Ø	3Ø	1	31	2	32	3	33	4	34	5	35	6	36	7	37						
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F						
@	4Ø	A	41	B	42	C	43	D	44	E	45	F	46	G	47						
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F						
P	5Ø	Q	51	R	52	S	53	T	54	U	55	V	56	W	57						
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F						
`	6Ø	a	61	b	62	c	63	d	64	e	65	f	66	g	67						
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F						
p	7Ø	q	71	r	72	s	73	t	74	u	75	v	76	w	77						
x	78	y	79	z	7A	{	7B	|	7C	}	7D	~	7E	DEL	7F						

Symbols, defined below, are used throughout the command/response table to represent variables in the command/response fields. Command and response examples are shown throughout the table.

Symbols

↵ = Carriage return/line feed

• = Space

X1 = Address number 00 – 97
00 addresses all units, but individual units do not respond.
97 is the factory-installed default for the transmitter.
Transmitter address + 1 is defined as the device connected to the receiver's RS-232 port.

NOTE *The very first command that you send to the transmitter must be the connect, [CCX1], command, where X1 is the transmitter's address. The transmitter* ***will not accept*** *other commands or respond until it has been addressed.*

The very last command that you send to the transmitter should be the connect, [CCX1], command, where X1 is a different address. This prevents the transmitter from accepting and responding to commands meant for other devices.

X2 = Input number 01 – 04

X3 = On/off status 0 = off, 1 = on

X4 = Input volume –15 (dB) of attenuation (minimum volume) through 00 (dB) (maximum volume)

X5 = Output level –31 (dB) of attenuation (maximum attenuation) through 20 (dB) (maximum gain)

X6 = Button or code
01 = input 1 code
02 = input 2 code
03 = input 3 code
04 = input 4
05 = projector power off code
06 = projector power on code

X7 = ASCII button code Up to 63 alphanumeric characters.
If you need to use the bracket delimiters in a stored ASCII command, you need to use the insert brackets feature. With this feature, one character replaces the left bracket ([ ) and another character replaces the right bracket ( ]). The default values are a single quote mark (‘) in place of the left bracket and a double quote (“) in place of the right bracket. The TPT150 replaces the characters with the bracket delimiters in the stored ASCII or hex command string.

X8 = Hex button code Similar to the ASCII button code, X7, with the addition of an ASCII-to-hex conversion before the value is stored. For example, if you send the ASCII value 0F, the TPT150 converts it to the hex value 0F. When you press the button, the TPT150 sends 0F hex. Entries must be in pairs; use a leading 0 if necessary. Letters must be uppercase. Spaces between bytes are not allowed.

NOTE *The insert brackets feature is not available for hex codes.*

X9 = Projector power timeout interval 000 or 001 - 255 (minutes). 000 = no timeout.

X10 = Power on (warm up) delay (in seconds) 000 – 060

X11 = Power off (cool down) delay (in seconds) 000 – 256

NOTE *Leading zeroes in the power on and power off delay are accepted but not required.*

X12 = Baud rate
0 = 1200 1 = 2400 2 = 4800
3 = 9600 (default) 4 = 19,200 5 = 38,400

X13 = Parity mode: 0 = no parity (default), 1 = odd parity, 2 = even parity

X14 = Stop bits: 0 = 1 stop bit, 1 = 2 stop bits

X15 = Flow control mode: 0 = disable (default), 1 = enable (software flow control (Xon/Xoff)

X16 = Reset level: 0 = reset the serial port to 9600 baud, no parity, Xoff, and half duplex mode; reset the address to 97; and enable the front panel. Do not reset input codes, projector power codes, or volume settings.
1 = perform all of the same resets AND erase all input codes, projector power codes, and volume settings.

X17 = Architectural information:
S150•*{serial #(9 digits)}*•*{Rev level (1 character)}*•*{firmware #(5 or 6 digits)}*•*{firmware Rev level(2 digits)}*•*{selected baud rates}*1200,2400,4800,9600,19200,38400•*{reserved for future use}*

Command/response table for programming and operating the TPT150

Command	ASCII Command (host to TPT150)	Response (TPT150 to host)	Additional description
Addressing			
Connect	[CCX1]	{none}	Connect the host computer to the addressed unit. This command is case sensitive.
Change address number	[ADDRX1]	[R0•X1•ADDRX1•]	Change the TPT150's address to X1 and the displays to X1+1.
Example:	[ADDR95]	[R0•95•ADDR95•]	Change the transmitter's address number to 95 and the display's to 96.
Reset address to factory default	[ADDR@]	[R0•X1•ADDR@•]	Reset the TPT150's and display's addresses to the factory defaults (97 and 98 [97 +1]).
Input selection			
Select an input	[CHX2]	[R0•X1•CHX2•]	Select input X2 to transmit to the receiver and output to the display.
Increment input selection	[CH+]	[R0•X1•CH+•]	Select the next higher input to transmit to the receiver and output to the display. If you send this command when input 4 is selected, the transmitter wraps around to select input 1.
Decrement input selection	[CH–]	[R0•X1•CH–•]	Select the next lower input to transmit to the receiver and output to the display. If you send this command when input 1 is selected, the transmitter wraps around to select input 4.
Query input selection	[CH?]	[R0•X1•CH?•X2]	Input X2 is selected.
Blanking and muting			
Blank the output	[BLANK1]	[R0•X1•BLANK1•]	Mute the output video.
Unblank the output	[BLANK0]	[R0•X1•BLANK0•]	Unmute the output video.
Toggle the blank status	[BLANK]	[R0•X1•BLANK•]	Toggle the audio mute on and off.
Mute the output	[MUTE011]	[R0•X1•MUTE011•]	Mute the output audio.
Unmute the output	[MUTE010]	[R0•X1•MUTE010•]	Unmute the output audio.
Toggle the mute status	[MUTE]	[R0•X1•MUTE•]	Toggle (change the state of) the audio mute).
Query mute status	[MUTE01?]	[R0•X1•MUTE01?•X3]	The audio output is X3 (0 = off [audio unmuted], 1 = on [audio muted]).

Command/response table for programming and operating the TPT150 (Cont'd)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Input audio level			
Adjust the input audio level	[VIN[X2][X4]0]	[R0•[X1]•VIN[X2][X4]0•]	Set the input [X2] audio level to a specified value.
NOTE *Leading zeros are* required *in the input number ([X2]).*			
Two-digit numbers are required *for the audio level variable ([X4]); use leading zeroes as required.*			
The negative sign (–) is required *for audio attenuation level variable values other than 00)*			
Example:	[VIN02–13]	[R0•95•VIN02–13•]	
Increment the input audio level	[VIN[X2]+]	[R0•[X1]•VIN[X2]+•]	Increase the input [X2] audio level by 1dB.
Decrement the input audio level	[VIN[X2]–]	[R0•[X1]•VIN[X2]–•]	Decrease the input [X2] audio level by 1dB.
Query the input audio level setting	[VIN[X2]?]	[R0•[X1]•VIN?•[X4]]	The audio input [X2] audio level is set to [X4]dB.
Reset all inputs' audio levels	[VIN@]	[R0•[X1]•VIN@•]	Set all input's audio level adjustments to their factory defaults (0dB).
Output level			
Adjust the audio output level	[VOL01[X5]0]	[R0•[X1]•VOL01[X5]0•]	Set the output level to a specified value.
NOTE *Two-digit numbers are* required *for the level variable ([X5]), use leading zeroes as required.*			
The negative sign (–) is required *for attenuation level variable values other than 00)*			
Example:	[VOL01–130]	[R0•95•VOL01–130•]	
Increment the output level	[VOL+]	[R0•[X1]•VOL+•]	Increase the output level by 1dB.
Decrement the output level	[VOL–]	[R0•[X1]•VOL–•]	Decrease the output level by 1dB.
Query the output level setting	[VOL?]	[R0•[X1]•VOL?•[X5]]	The audio output level is set to [X5]dB.
Reset the output level	[VOL@]	[R0•[X1]•VOL@•]	Set the output level adjustment to its factory default (0dB).
Program projector power and input command codes			
Store ASCII code to a button	[PCL1[X6][X7]]	[R0•[X1]•PCL1[X6][X7]•]	Program button [X6] code to [X7].
Example:	[PCL103'S-video"]	[R0•[X1]•PCL103'S-video"•]	Program button 2 to send the command string [S-video]. The ' and " characters insert the delimiter brackets for devices that require them.
View a button's ASCII code	[PCL1[X6]?]	[R0•[X1]•PCL1[X6]?•[X7]]	
Example:	[PCL103?]	[R0•[X1]•PCL103[S-video]]	View button 3's command string [S-video]. The ' and " characters insert the delimiter brackets for devices that require them.
NOTE *Brackets inserted using the insert brackets feature appear as brackets when you use view command.*			
Store hex code to a button	[PCH1[X6][X8]]	[R0•[X1]•PCH1[X6][X8]•]	Program button [X6] code to [X8].
Example:	[PCH1020F]	[R0•97•PCH1020F•]	Program button 2 to send the hex command string 0F.
View a button's hex code	[PCH1[X6]?]	[R0•[X1]•PCH1[X6]?•[X8]]	
NOTE *The insert brackets feature is not available for hex codes.*			

Command/response table for programming and operating the TPT150 (Cont'd)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Program projector power and input command codes (continued)			
Reset button code (ASCII or hex)	[PCL1X6@]	[R0•X1•PCL1X6@•]	Clear any codes assigned to a button. The transmitter does not send any code when the button is pressed.
Assign a projector power timeout	[TOUT05X9]	[R0•X1•TOUT05X9•]	Set the transmitter to issue the power off command X9 minutes after power on.
Example:	[TOUT05060]	[R0•97•TOUT05060•]	The projector is powered off after 60 minutes.
View the projector power timeout	[TOUT05?]	[R0•X1•TOUT05?•X9]	The projector power timeout is set to X9 minutes.
Projector commands			
Send projector power code	[PPWRX3]	[R0•X1•PPWRX3•]	Send the projector power on or off (X3) command. (0 = power off, 1 = power on).
Toggle the projector power	[PPWR]	[R0•X1•PPWR•]	If the projector power is on, turn it off; if it is off, turn it on.
Set the power on delay	[PPWRD1X10]	[R0•X1•PPWRD1X10•]	Set the power on (warm up) delay to X10 seconds. During the delay, serial commands to the projector and TPT150 front panel operation are disabled.
Set the power off delay	[PPWRD0X11]	[R0•X1•PPWRD0X11•]	Set the power off (cool down) delay to X11 seconds. During the delay, serial commands to the projector and TPT150 front panel operation are disabled.
Enable automatic audio mute and unmute during the projector power command.	[PPWRM1]	[R0•X1•PPWRM1•]	Mute the audio when the projector power off command is issued; unmute the audio when the power on command is issued.
Disable automatic mute/unmute	[PPWRM0]	[R0•X1•PPWRM0•]	
Serial port configuration			
Set both serial ports' parameters	[CP1X12X13X14X15 02 X12X13X14X15 0]	[R0•X1•CP1X12X13X14X15 02 X12X13X14X15 0•]	
Command description:	[CP1 **X12** **X13** **X14** **X15** 02 **X12** **X13** **X14** **X15** 0] (1 = transmitter port; 2 = receiver port; X12 Baud rate, X13 Parity, X14 Stop bits, X15 Flow control)		
Example:	[CP130000241110]	[R0•97•CP130000241110•]	Set the transmitter's serial port to 9600 baud, no parity, and 1 stop bit, Xoff; set the receiver's serial port to 19200 baud, odd parity, 2 stop bits, and Xon.
NOTE *If you change the transmitter's settings, you may not be able to read the response until you change the controller's settings.*			
Set transmitter's serial port parameters	[CP1X12X13X14X15 0]	[R0•X1•CP1X12X13X14X15 0•]	
Reset both serial ports to default	[CP1@]	[R0•X1•CP1@•]	Reset both serial ports to their default settings: 9600 baud, no parity, 1 stop bit , and Xoff.
View both serial ports' parameters	[CP1?]	[R0•X1•CP1?•X12X13X14X15X12X13X14X15]	

Command/response table for programming and operating the TPT150 (Cont'd)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Front panel lockout			
Disable front panel	[FP0]	[R0•X1•FP0•]	Disable the transmitter's buttons.
Enable front panel (default)	[FP1]	[R0•X1•FP1•]	Enable transmitter's buttons.
Toggle front panel lockout	[FP]	[R0•X1•FP•]	Toggle front panel status (enabled-to-disabled or disabled-to-enabled).
View front panel lockout	[FP?]	[R0•X1•FP?•X3]	0 = front panel off, 1 = on.
Transmitter reset			
Reset transmitter	[DFLTX16]	{none}	0 = reset serial port settings and addresses without deleting input button codes, projector power codes, input audio level, and volume. 1 = factory reset, including input codes, projector power codes, input audio levels, and volume level.
Architectural information			
View architectural information	[ARC]	[R0•X1•ARC•X17↵]	Display the transmitter model, revision, and connection information.

Appendix A

Reference Information

Specifications

Part Numbers

Reference Information

Specifications

Video

Gain	Unity
Crosstalk	-42dB @ 10 MHz
Number/signal type	1 set of proprietary analog signals
Connectors	1 RJ-45 female jack

Video input

Number/signal type	
TPT150	1 VGA-UXGA RGBHV, RGBS, RGsB with 1 RGB buffered local monitor loop-through 1 VGA-UXGA RGBHV, RGBS, RGsB 2 component video (Y, R-Y, B-Y), or S-video, or composite video
TPR150	1 set of proprietary analog signals from a TPT150
Connectors	
TPT 150	2 female 15-pin HD (RGB input) 1 female 15-pin HD (RGB loop-through) 2 sets of [3 female RCA (component video), 1 female RCA (composite), 1 female 4-pin mini DIN (S-video)]
TPR150	1 female RJ-45 jack
Nominal level	1 V p-p for Y of component video and S-video, and for composite video 0.7 V p-p for RGB 0.3 V p-p for R-Y and B-Y of component video, and for C of S-video
Minimum/maximum levels	Analog: 0.3 V to 1.5 V p-p with no offset at unity gain
Impedance	75 ohms
Return loss	<-44dB @ 5 MHz
DC offset (max. allowable)	±0.5 mV

Video output

Number/signal type	
TPT150	1 set of proprietary analog signals
TPR150	1 RGBHV, RGBS, RGsB 1 component video(Y, R-Y, B-Y) 1 S-video 1 composite video
Connectors	
TPT150	1 female RJ-45 jack
TPR150	1 female 15-pin HD (RGB) 3 female RCA (component video) 1 female 4-pin mini DIN (S-video) 1 female RCA (composite video)
Nominal level	1 V p-p for Y of component video and S-video, and for composite video 0.7 V p-p for RGB 0.3 V p-p for R-Y and B-Y of component video, and for C of S-video
Minimum/maximum levels	0.3 V to 1.5 V p-p
Impedance	75 ohms
Return loss	-22dB @ 5 MHz
DC offset	±0.5 mV with input at 0 offset

Sync

Input type	RGBHV, RGBS, RGsB
Output type	RGBHV, RGBS, RGsB (follows input)

Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level	2.3 V to 4.6 V p-p, unterminated
Output level	3.2 V to 4.6 V p-p, unterminated
Input impedance	510 ohms
Output impedance	75 ohms
Max. input voltage	4.6 V p-p
Max. propagation delay	760 ns
Max. rise/fall time	35 ns
Polarity	Negative

Audio — TPT150 only

Gain	-30dB to +9dB, adjustable
Frequency response	20 Hz to 20 kHz, ±2.4dB
THD + Noise	0.04% @ 1 kHz at nominal level
S/N	>-96dB at maximum output
Crosstalk	<-93dB @ 20 kHz, fully loaded
Stereo channel separation	>-90dB @ 1 kHz

Audio input — TPT150 only

Number/signal type	4 stereo, unbalanced
Connectors	4 pairs of RCA connectors
Impedance	>7.8k ohms unbalanced, DC coupled
Nominal level	2.22dBu (1 Vrms)
Maximum level	+10.1dBu, (unbalanced) at 1%THD+N

NOTE *0dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2dBu*

Audio output — TPT150 only

Number/signal type	1 stereo, balanced/unbalanced
Connectors	(1) 3.5 mm captive screw connector, 5 pole
Impedance	51 ohms unbalanced
Gain error	±0.03dB channel to channel
Maximum level (Hi-Z)	>+10.2dBu, balanced or unbalanced at 1%THD+N
Maximum level (600 ohm)	>+4.2dBm, balanced or unbalanced at 1%THD+N

Control/remote — transmitter (TPT150)

Serial control port	RS-232, 9-pin male D connector
Baud rate and protocol	38400, 19200, 9600 (default), 4800, 2400, or 1200 baud (configurable); 8 data bits; 1 (default) or 2 stop bits; no parity (default), or even or odd parity
Serial control pin configurations	2 = RX, 3 = TX, 5 = GND
Contact closure	(1) 3.5 mm captive screw connector, 8 pole for a CTP150CM control panel or locally constructed device
Contact closure pin configurations	1 = input 1, 2 = input 2, 3 = input 3, 4 = input 4, 5 = volume up, 6 = volume down, 7 = projector power, 8 = GND
Program control	Inline Control Software for Windows® – lCS100

Control — projector (TPR only)

Projector control port	RS-232, 9-pin male D connector
Baud rate and protocol	38400, 19200, 9600 (default), 4800, 2400, or 1200 baud (configurable); 8 data bits; 1 (default) or 2 stop bits; no parity (default), or even or odd parity

General

Power	90 VAC to 260 VAC, 47 to 63 Hz, internal, autoswitchable TPT150: 9 watts TPR150: 20 watts
Temperature/humidity	Storage -40° to +158°F (-40° to +70°C) / 10% to 90%, noncondensing Operating +32° to +104°F (0° to +40°C) / 10% to 90%, noncondensing
Rack mount	
TPT150	Yes, with included brackets, part #MTR102
TPR150	No, but projector pole mountable with included L brackets
Enclosure type	Metal
Enclosure dimensions	
TPT 150	1.7″ H x 17.0″ W x 11.5″ D (1U high, full rack wide) 4.3 cm H x 43.2 cm W x 29.2 cm D (Depth excludes connectors. Width excludes rack ears. Height excludes rubber feet.)
TPR150	1.7" H x 11.75" W x 6.0" D (1U high) 4.3 cm H x 29.8 cm W x 15.2 cm D (Depth excludes connectors. Width excludes rack ears. Height excludes rubber feet.)
Product weight	
TPT150	5.2 lbs (2.4 kg)
TPR150	2.2 lbs (1.0 kg)
Shipping weight	13 lbs (6 kg)
DIM weight	
USA/Canada	11 lbs (5 kg)
International	12 lbs (6 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Listings	UL, CUL
Compliances	CE, FCC Class A
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE *All nominal levels are at ±10%*

NOTE *Specifications are subject to change without notice.*

Part Numbers

Included parts

These items are included in each order for a TPS150:

Included parts	Part number
TPS150 twisted pair (TP) switching and transmission system	70-369-01
TPT150 switching transmitter	60-575-01
TPR150 receiver	60-574-01
Rack mounting ears	992546-2
Projector pole mounting brackets	992547-2
3.81 mm captive screw connector	10-265-02
3.5 mm captive screw connector	10-579-01
ICS100 control software	
IEC power cord	
Tweeker (small screwdriver)	
TPS150 User's Manual	
VGA M6' MHR (molded) VGA cable (6 feet/1.83 meters)	26-238-01
6' component video cable (6 feet/1.83 meters)	26-601-01
SVHS 6' S-video cable (6 feet/1.83 meters)	26-316-02
6' RCA male-to-male composite video cable (6 feet/1.83 meters)	26-600-01

Optional accessories

Accessory	Part number
CTP150 remote control panel, black	60-614-10
CTP150 remote control panel, white	60-614-20

FCC Class A Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Note: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:

Extron Electronics
1001 East Ball Road
Anaheim, CA 92805, USA

Europe, Africa, and the Middle East:

Extron Electronics, Europe
Beeldschermweg 6C
3821 AH Amersfoort
The Netherlands

Asia:

Extron Electronics, Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363

Japan:

Extron Electronics, Japan
Daisan DMJ Bldg. 6F,
3-9-1 Kudan Minami
Chiyoda-ku, Tokyo 102-0074
Japan

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions or non-Extron authorized modification to the product.

If it has been determined that the product is defective, please call Extron and ask for an Applications Engineer at (714) 491-1500 (USA), 31.33.453.4040 (Europe), 65.383.4400 (Asia), or 81.3.3511.7655 (Japan) to receive an RA# (Return Authorization number). This will begin the repair process as quickly as possible.

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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